

Remarks/Arguments

A. Status of the Claims

Claims 22-67 were pending as of the January 11, 2008, mailing date of the current Office Action. Claims 40 and 61 are revised. No claims have been added or canceled.

Claims 22-67 are pending.

B. Written Description Rejection

Claims 22-67 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description rejection. In particular, the Examiner takes the position that the phrase “wherein the beam of positive ions is formed with an ion gun” lacks support in the specification.

Applicant disagrees. There is ample support in the detailed description and in Figures 1 and 2 of the specification for the invention as currently claimed.

Claim 22 includes forming on a SiO_xF_y layer, a SiO_2 silica and/or a metal oxide protective layer. The SiO_2 silica and/or a metal oxide protective layer is formed through ion beam-assisted vapor deposition which includes “bombarding the layer being formed with a beam of positive ions formed from a rare gas, from oxygen or from a mixture of two or more of such gases... wherein the beam of positive ions is formed with an ion gun.” Claim 22. The SiO_2 silica and/or a metal oxide protective layer can also be formed through “cathodic sputtering of a metal or silicon layer followed by an oxidation step of the deposited metal or silicon layer.” *Id.*

Figure 1 of the specification provides a non-limiting example of this process. *See* specification at page 8, lines 28-29 (“Fig. 1, a schematic view of a device for carrying out the process of the invention.”). In Figure 1, the supply line **11** of the ion gun **7** is connected with three gas feed devices. *Id.* at page 9, lines 18-19. This makes “it possible to simultaneously or independently supply the ion gun with gases of the desired nature and/or flow rates.” *Id.* at lines

19-21. The specification also explains that the gases can be rare gasses or oxygen. *Id.* at page 5, lines 7-9; page 10, line 16; original filed claims. The positive ions referred to in claim 22 can be “derived from” the rare gasses or oxygen or mixtures thereof. *Id.* at page 2, lines 31-34. The specification even provides the following written description of using the ion gun to form an SiO₂ layer:

When the anode voltage and the anode current of the **ion gun 7** are stabilized both plugs are opened, and therefore, **a SiO₂ layer is deposited with an ion beam assistance (SiO₂ IAD).** When the selected thickness of the SiO₂ IAD layer is obtained, both plugs are closed, the electron beam **5** and ion **7** guns are cut off, the supply of the various gases is stopped, and the vacuum in the chamber **1** is broken.

Id. at page 10, line 17-23 (emphasis added).

The above confirms Applicant was in possession of the claimed invention upon filing. MPEP 2163.03 (“Whenever the issue [of written description] arises, the fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed.”).

Applicant requests the written description rejection to be withdrawn.

C. Indefiniteness Rejection

Claims 40 and 61 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. These claims have been revised to address the Examiner’s concerns.

Applicant requests that the Indefiniteness rejection be withdrawn.

D. Obviousness Rejections

Three separate obviousness rejections are presented. The following sections provide arguments against these rejections.

1. Claims 22-30, 33, and 47-54 are not rendered obvious by EP 0975017 (“Lee”) in view of U.S. Patent 5,719,705 (“Machol”)

Claims 22-30, 33, and 47-54 are said to be obvious over EP 0975017 (“Lee”) in view of U.S. Patent 5,719,705 (“Machol”). The Examiner concedes that Lee fails to disclose the use of an ion gun to form a SiO₂ silica and/or a metal oxide protective layer on the SiO_xF_y silicon oxyfluoride layer. Action at page 3. Machol is cited for disclosing “well known deposition techniques of silicon oxide layers in the art. *Id.* From this, the examiner concludes that “it would have been obvious to a routineer in the art to utilize any known technique of deposition of metal oxides, including this instantly listed in claims 22 and 47.” *Id.*

Applicant disagrees. The claimed invention is not rendered obvious over Lee in view of Machol for at least the following reasons.

i. It is not obvious to utilize any known deposition technique (Machol) in the art to deposit the metal oxide layer in a manner claimed by Applicant

The Examiner’s position that “[i]t would have been obvious to a routineer in the art to utilize any known technique of deposition of metal oxides, including those instantly listed in claims 22 and 47” is incorrect. The claimed invention does not utilize any known deposition technique; rather it concerns sputtering or ion assisted deposition, which, contrary to PECVD (also cited in Machol) or other deposition techniques of Machol, lead to stabilized SiO_xF_y layers.

A review of Machol confirms that this is a general reference that only deals with multilayer antireflection coatings. Machol neither describes SiO_xF_y layers nor protective layers. Rather, this reference simply discloses several available methods for depositing antireflection

coating layers, such as silica layers. *See* Machol at col. 6, line 49, to col. 7, line 39. Indeed, this reference states:

The substantially transparent multilayer film structure of the inventive AR coating can be fabricated by conventional film deposition techniques (chemical and physical) including reactive sputter deposition, chemical vapor deposition and **electron beam evaporation, with and without ion assist.**

Id. at col. 6, lines 49-53 (emphasis added).

Attached at Appendix A is a declaration from Karin Scherer ("Scherer Declaration") (an inventor of the present application and an employee of the assignee—ESSILOR International (Compagnie Generale D'Optique) confirming that any known deposition technique cannot be used to stabilize a SiO_xF_y layer. Indeed, electron beam evaporation without ion assistance is not successful.

The Scherer Declaration provides extrinsic evidence confirming that, contrary to the Examiner's opinion, it is not obvious to utilize any known deposition technique in the art to deposit the metal oxide layer in a manner claimed by Applicant. *See KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) (cautioning against the dangers of overemphasizing on the explicit content of a cited art reference). Rather, Applicant's claimed invention involves more than the simply substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement; the data within the Scherer Declaration confirms this.

ii. Those skilled in the art had no reason to replace the PECVD technique cited in Lee with evaporation under ion assistance or sputtering (two of the techniques cited in Machol)

A second reason confirming the non-obviousness of the claimed invention resides in what Machol fails to disclose or suggest. That is, Machol is not useful to those skilled in the art, who already know the methods cited therein. This reference fails to teach that choosing evaporation under ion assistance or sputtering followed by oxidation rather than other techniques such as

CVD or evaporation without ion assistance allows for the deposition of a SiO₂ layer capable of stabilizing an underlying SiO_xF_y layer.

The point is not whether the skilled person could have arrived at the invention by modifying or combining the cited art (*i.e.*, by choosing the claimed deposition techniques among those cited in Machol), but rather whether, in expectation of the advantages actually achieved, he/she would have done so. Those skilled in the art had no reason to replace the PECVD technique cited in Lee (which does not prevent diffusion of fluorinated species) with evaporation under ion assistance or sputtering (the two techniques cited in Machol), and no reason to believe that such modification would work. *KSR* at 1396 (highlighting the importance of determining “whether there was an apparent reason to combine the known elements in the fashion claimed by [Applicant].”); *see also Manual of Patent Examining Procedure* (MPEP) § 2143.01[III] (“The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art.”) (underline in original). The Scherer Declaration confirms that the combination of any known deposition technique (Machol) with the process disclosed in Lee would not necessarily lead to a predictable result.

It appears that the Examiner made an *ex post facto* analysis by drawing on knowledge of the invention, when assessing the obviousness of the claimed invention. This sort of hindsight approach is improper. *KSR* at 1397 (“A factfinder should be aware, of course, of the decision caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.”). The Examiner’s conclusions go beyond what the skilled person would have objectively inferred from the cited art, without the benefit of hindsight knowledge of the claimed invention.

In the present case, choosing the appropriate deposition technique is not a predictable variation that could have been implemented by a person of ordinary skill. Choosing the

appropriate deposition technique is an intellectual possibility, but was not identified as a predictable potential solution to the recognized problem of stabilizing SiO_xF_y layers.

Indeed, there is no relationship either in the cited art references or in common general knowledge between the deposition technique of the SiO_2 layer and its ability to protect an underlying SiO_xF_y layer from fluorine out diffusion. This unpredictable relationship was discovered by the present inventors.

Applicant respectfully submits that the Examiner's obviousness finding is inappropriately based upon selectively choosing and excluding various disclosures in Machol. Such rationale is inappropriate because it stems from the benefit of hindsight knowledge of the invention. As such, the combination of these references does not render the claimed subject matter obvious because it does not direct those skilled in the art to the claimed combination without any need for choosing among various depositions methods in Machol not directly related to the recognized problem of stabilizing SiO_xF_y layers.

iii. Those skilled in the art had no reason to believe that modifying Lee with the deposition techniques in Machol would work

The Examiner has not established that there would have been a reasonable expectation of success (MPEP § 2143.02) that the combination of Lee and Machol would have yielded nothing more than predictable results to one of ordinary skill in the art. For a routineer to try any known technique of deposition, there must be a reasonable expectation of success, and there must also be a finding that choosing the appropriate deposition technique is a potential solution to the stabilization problem. However, there is no evidence on record suggesting that the modification of Lee with a specifically chosen method of Machol would be successful, and it has been previously explained that selecting the appropriate deposition method was not a predictable solution to the stabilization problem. Consequently, it is not possible to argue that those skilled in the art would have modified the SiO_2 deposition technique in Lee with the specific technical

purpose in mind of improving the ability of said layer to act as a protective barrier. The Scherer Declaration supports this.

iv. Lee teaches away from the claimed invention

A “reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Appellant.” *Tec Air Inc. v. Denso Mfg. Michigan Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999).

The teachings of Lee would lead a person of ordinary skill in the art away from using Applicant’s SiO₂ protective layer and instead towards using a SiO_xN_y protective layer. In this regard, Lee discloses that a SiO₂ layer is permeable to fluorinated substances:

However, fluorine substances, including fluorine itself, **will diffuse well into silicon dioxide films** and the diffusion length (penetration depth) thereof can be in excess of several thousand angstroms.

Lee at paragraph [0016] (emphases added). Lee fails to transform a SiO₂ layer, which is permeable to fluorinated substances, into a protective layer impermeable to fluorinated substances. Rather, Lee advises to use a SiO_xN_y protective layer to achieve this result. *Id.* at [0021].

The fact that Lee teaches away from the claimed invention is a significant factor to be considered in determining obviousness. *In re Gurley*, 27 F.3d 551, 554 (Fed. Cir. 1994).

2. Dependent claims 30, 31, and 32 are not rendered obvious by Lee in view of Machol and in further view of Lee *et al.*

Dependent claims 30-32 are said to be obvious over Lee in view of Machol and in further view of Lee *et al.* Applicant disagrees. The arguments presented in the above section equally apply to this rejection and are incorporated by reference. Further, it is well-settled that if an independent claim is nonobvious under 35 U.S.C. § 103(a), then any claim depending therefrom is nonobvious. MPEP § 2143.03.

3. Claims 22-30 and 33-67 are not rendered obvious by Machol in view of Lee *et al.* and in further view of Lee

Claims 22-30 and 33-67 are said to be obvious over Machol in view of Lee *et al.* and in further view of Lee. Action at page 5. The Examiner alleges that Lee *et al.* discloses a method for producing a SiO_xF_y film with IBAD of a silicon film, and that it would be advantageous to use this layer in an antireflective coating because the low index silicon oxyfluoride thin films can reduce the number of high and low index multilayers and widen the bandwidth of multilayer high reflectors. From this, the Examiner argues that it would have been obvious to use the Lee *et al.* SiO_xF_y film with in the antireflective coating of Machol.

Applicant disagrees. The arguments made in section 1 above apply equally to this rejection and are incorporated by reference. In an effort to make the record complete in the event that this case is appealed, Applicant provides the following additional comments concerning this rejection.

This rejection is without basis, as there is **no evidence** that the process of Lee *et al.* is combinable with Machol. Indeed, independent claims 22 and 47 are dedicated to a stabilized SiO_xF_y layer, whereas neither Lee *et al.* nor Machol suggest a way to stabilize such layer. Machol is a general reference that deals with the preparation of uncoated SiO_xF_y layers, which are not comprised in a stack, while Lee *et al.* does not suggest a SiO_xF_y layer.

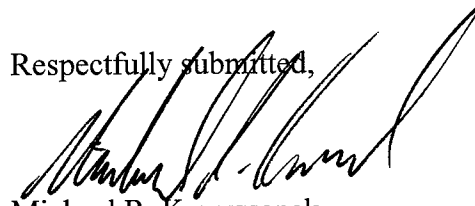
The Examiner's observation that the SiO_xF_y layer of Machol could be incorporated in the antireflection stack of Lee *et al.* is correct. However, the order in which the layers are stacked in Applicant's invention is contrary to the teaching of Lee *et al.* Lee *et al.* only suggests antireflection stacks having alternating layers of high and low refractive index (see the abstract). A SiO_xF_y layer is a low refractive index layer, as confirmed by Machol, and cannot be coated with another low refractive index layer, such as SiO_2 , according to the teaching of Lee *et al.* Therefore, it can be said that Lee *et al.* teaches away from the invention in this respect.

In addition, even though those skilled in the art could conceive a $\text{SiO}_x\text{F}_y/\text{SiO}_2$ stack, none of the cited references teaches how to prevent fluorine diffusion out of the SiO_xF_y layer. Again, Lee discloses that a SiO_2 layer is permeable to fluorinated substances and instead advises using a SiO_xN_y protective layer to achieve this result.

E. Conclusion

Applicant believes that this is a full and complete response to the Office Action mailed January 11, 2008. A Notice of Allowance is requested. Should the Examiner have any questions, comments, or suggestions relating to this case, the Examiner is invited to contact Applicant's representative at (512) 536-3020.

Respectfully submitted,



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